THE OPTICAL MAGIC LANTERN JOURNAL AND PHOTOGRAPHIC ENLARGER.

EDITED BY J. HAY TAYLOR.

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Notices.

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NOTICE.

Many Correspondents still forward their Communications to the Old Address. Will they please note that Our Address is

56, CHANCERY LANE, LONDON, W.C.

Notes.

Many people seem to think that ether or other saturators have had their day. On investigation we are of the opinion that this is in the main the thoughts of those who for some reason or other have not yet tried them. The general reason given seems to be that ether is a dangerous thing to handle—so is a razor for that matter; but because a child gets hold of one and cuts its fingers, or a lunatic cuts his throat with this instrument, it would be ridiculous to suggest that people give up shaving on the plea that the razor is a dangerous instrument, or that steam-boilers should be discarded because some one in his carelessness exploded one. We think we may safely assert that saturators, instead of having had their day, are only now becoming popular, and we have not heard that anyone who has given it a thorough trial has anything to say against modern forms. A few more seasons will find them in general use.

* * *

On the 11th ult., at the Ashton-under-Lyne Photo Society, Mr. Lees gave a new departure in a lecture on making lantern-slides. He devoted a considerable time to projecting upon the screen a number of slides, showing various faults, at the same time pointing out how these faults could be remedied. During the same lecture he showed slides with clouds printed on the cover glass, and also repeated the same slide without the clouds, thus showing the great improvement in the former.

After the publication of our last journal we learned that the illustrations sent in with the article on page 147 were reproductions from the "Cyclist Annual" of 1885, the copyright of which belongs to Messrs. Iliffe and Son, and we hereby tender our apologies to that firm. We have communicated with the writer of the article in question, who also expresses his regret, he not having been aware of the previous publication by Messrs. Iliffe of the illustrations.

* * *

Mr. W. I. Chadwick was, we understand, the first person who published the method how to ascertain the contents of a cylinder of compressed gas, viz. :—By dividing the number of atmospheres indicated by the number of times that the capacity of the cylinder in feet was contained in 120.

* * *

A translation of Dr. Eder's "*Handbuch der Photographie*" is now appearing in the *Amateur Photographer*. Dr. Eder's book is recognised as a standard on emulsion photography.

* * *

When on a recent trip to Chicago, Mr. Archer (Archer & Sons, Liverpool) took some charming views in and about the exhibition. We have received a few prints from the negatives, and learn that the slides are being made as fast as possible.

* * *

Mr. Robert H. Clark, of Royston, Herts, finding it somewhat difficult to keep up with his numerous and increasing business in lanterns, slides, &c., has rebuilt a portion of his premises. These have just been completed, and Mr. Clark is now prepared to supply lanternists with anything and everything on the shortest possible notice.

—:o:—

Judging Lantern-slides at Exhibitions.

At a meeting held recently, at which Mr. Andrew Pringle and some other well-known judges at photographic exhibitions were among those present, the wise resolution was passed that no awards should be made in relation to lantern-slides without projecting images of them upon the screen, the decisions to depend upon the appearance of the projections. With a colourless slide, presenting nothing but pure black and white, this may not be so necessary; but when colour comes into play it is exceedingly necessary. For instance, the more delicate purples which make some slides look exceedingly beautiful by daylight, are quite lost when projected by a light rich in yellow rays, such as that from an oil lamp; and with the limelight the result is not much better, that light, despite its brilliancy, being poor in true violet rays. The electric light does most justice to this class of slide; the magesium light also would be good were it practically available. The question ought farther to have been decided by the judges, whether the particular light for use with which the slides were intended should not be used in the judging. For instance, in the course of some experimental researches in relation to the obtaining of images of different colours with photographic transparencies, a person known to us has obtained rich tones by one method, in which it has not yet been possible to avoid a pale primrose stain over the whole slide, something to the eye like that presented by photographs taken by the primuline process. The tinge is such that with an oil light it would scarcely be perceptible, if at all, yet would add to the warm appearance of the image on the screen, but with the limelight would probably be recognised as yellow.

There is another point to be considered—namely, that as purple images when projected upon the screen by ordinary lights appear to be of some other colour, it is impossible to tell by inspection of such slides in daylight exactly what that colour will be. In some cases it is rich, in others it is poor. The new plan of judging will be a boon to disappointed competitors, because in daylight they can point out to their friends their own slides, and how much better they look than those which have taken prizes. This raises the further problem—Is it judicious to place lantern-slides on public view by daylight at exhibitions, in those cases in which the awards bear relation to the colours of the slides as seen upon the screen?

—:o:—

The Problem of Inexpensive Stereoscopic Projection.

A difficulty in the way of the utilisation for public purposes of stereoscopic lantern projections, in which the effects are produced by means of polarised light is, that an analyser has to be placed in the hands of every person present; this, in any case, means a somewhat large first outlay on the part of the exhibitor, and in the case of a public exhibition, in which six or seven hundred persons are admitted on payment, there is, unfortunately, reason to fear that in the present state of society some of the analysers would be missing at the close of the performance. Mr. Anderton has done much to reduce outlay, by bringing the analyser down but to two mounted bundles of good glass, yet he, probably, would be glad to see some additional reduction in this item of expense. A somewhat troublesome way out of the difficulty might be to charge individuals for the analyser as they enter the place of entertainment, and to return them the money as they come out, and give it back.

First-class polariscopic apparatus has had a tendency to become dearer of late years, because of the Iceland spar famine. The world practically had to depend upon but two or three mines in Iceland for the supply of the crystals. A landslip covered up one of them, and the others are now stated to be exhausted, and partly filled with water. Better methods of cutting and building up Iceland spar prisms have been devised by Mr. Ahrens and others, and this has aided the economical use of what little Iceland spar is now to be had. So great is the spar famine that some men of science have looked with greedy eyes at the gigantic pair of Iceland spar prisms presented years ago by Mr. William Spottiswoode to the Royal Institution; they long to cut them up for optical instruments innumerable.

Photographic Work recently suggested that attempts should be made to produce large crystals of what have been called artificial tourmalines, but which consist of a salt which the late Mr. William Herapath, who discovered its optical properties, called sulphate of iodoquinine. Mr. Herapath was a noted analytical chemist, and he knew it, which perhaps may account for his also putting "Herapathite," as a name of the salt, in his first detailed publication of the method of making it in large crytals, as published in *The Philosophical Magazine* of November, 1853. The name of "Herapathite" originated with Professor Haidinger. Mr. Herapath stated therein that two plates scarcely thicker than gold-leaf may be rendered "totally" impervious to light when crossed at right angles, and of a specimen pair sent to the editor of the *Magazine*, he said that one was six-tenths of an inch long and three-tenths of an inch broad; the other was of the same length as the first, but one-tenth of an inch broader. He remarked that they were as good for polarisers as tourmalines, for which four guineas each plate would be charged.

Mr. Herapath's method of manufacture, as described by himself, was to dissolve pure disulphate of quinine in pyroligneous acid of specific gravity 1·042, diluted with an equal quantity of proof spirit made by adding rectified spirit of wine, sp. gr. 0·837, to an equal bulk of distilled water. He next dissolved 40 grains of iodine in a fluid ounce of rectified spirit of wine, and then, after the preceding details, gave the following formula:—

Disulphate of quinine ...	50 grains.
Pyroligneous acid ...	2 fluid ounces.
Proof spirit	2 fluid ounces.
Spirituous solution of iodine	50 drops.

He dissolved the quinine salt in the pyroligneous acid mixed with spirit, warmed the solution to 130° F., and immediately added the solution of iodine, drop by drop, with occasional agitation of the mixture. He said that this formula gives to the matter liquid after crystallisation at 52° F., a specific gravity of 0·986, which appears highly favourable to the deposition of the majority of the crystalline production, and yet allows only the very broad and thinner plates to float, thus getting them perfectly free from all interfering and adhering plates. The temperature must be maintained a little after the addition of the iodine, and the solution then set aside to crystallise under certain delicate conditions. The room should have an equable temperature of about 45° or 50° F., or the currents produced by changes of temperature will destroy the parallelism of the crystals; a rise of temperature to 60° F., dissolves the thinner plates. The liquid must be free from vibration during the whole act of crystallisation, the room must be free even from ordinary vibrations. He preferred the method of Mr. Thwaites, who suspended the flask by the neck with strong twine to a string stretching across the apartment from one wall to the other. It is necessary that the surface of the liquid should not be exposed to too rapid evaporation, as its temperature would fall too quickly. The advantage of having a broad surface in proportion to the depth of the liquid is great, as the thinner and more easily-reached plates form on the surface. If after six hours the required broad plates do not make their appearance, it is but necessary to apply a spirit flame to the bottom of the flask to dissolve the deposited crystals, then add a little spirit and a few more drops of iodine, and again wait for crystallisation. When a crop of broad floating plates is formed, they should be allowed to remain in the liquid to from twelve or twenty-four hours to attain a proper degree of thickness, but they must not be allowed to remain in the liquid too long.

The string suspending the flask is then taken by the fingers and cut at its upper end with scissors; the flask is then gently placed on the mouth of a gallipot as a support. The difficult task of getting the crystals out of the liquid, without damaging them, is next described; a glass rod, with a little circular glass plate attached to it by wax upon a part of the edge of the plate, is pushed down the neck of the inclined flask, the glass circle is pushed gently beneath the largest crystal, then raised from the liquid by a depression of the hand, and drawn out. All fluid is then taken up thoroughly from the glass disc by blotting paper, and this must be done without touching the crystalline surface; the crystal is then dried by exposure to the air in a room having a temperature of 40° or 50° F. It is sometimes necessary to dip the crystals for an instant in a little cold distilled water containing a little iodine. After being again dried they are placed under a cupping glass, having a watch glass containing a few drops of tincture of iodine, which materially improves the power of polarisation of the crystal. About three hours of this exposure to the iodine vapour may be necessary, in a room having the temperature of 50° F. He then describes how to mount the crystals by covering them with another piece of thin microscope glass, and cementing them with very thin Canada balsam, without the application of much heat.

What has been said will give a fair idea of the process, but Mr. Herapath's full description of the operations is too long to quote here. In the *Philosophical Magazine* for May, 1854, and for May, 1855, are other articles by Mr. Herapath on the same subject. When the temperature of the room does not fall below 50° or 55° F., he advises the use of the following proportions:—

Disulphate of quinine ...	100 grains.
Acetic acid, sp. gr. 1·042.	4 fluid ounces.
Rectified spirit, sp. gr. 0·837	1 fluid ounce.
Spirituous solution of iodine	1 fluid drachm.

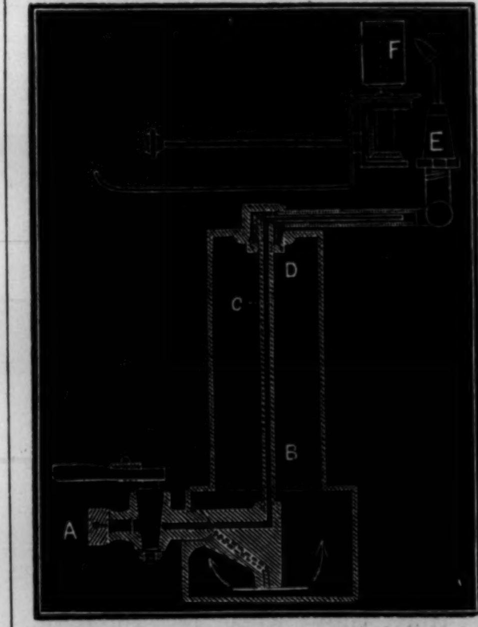
The crystals are produced more rapidly with this formula, and must be removed in three or four hours, or the mother liquid will dissolve them.

We have but given a brief outline of the methods of Mr. Herapath, but have stated enough, perhaps, to enable any experimenter who wishes to make himself an adept at the production of such polarisation crystals, to make a beginning, but for full information he should refer to the original memoirs.

Inside some Saturators.

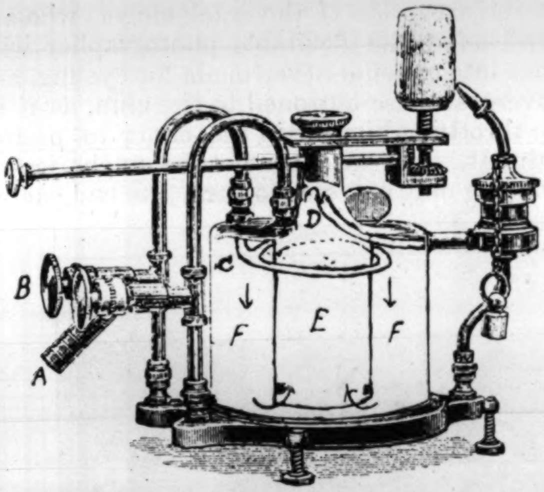
Seeing that many people still look upon saturators with a certain amount of suspicion, we thought it might tend to allay their unfounded fears if we gave them an opportunity of seeing the internal arrangements of certain saturators, and thus enabling them to have sufficient confidence in this method of producing the limelight to try one themselves. After so doing we have no hesitation in saying that those who have hitherto set their faces against saturators will welcome this method as a reliable one of producing a brilliant illumination of the mixed jet principle with the aid of one bottle of gas only, and that oxygen.

Our readers may remember that in the April number of this journal we gave a diagram of the single form of the Lawson saturator. Quite lately this saturator has been devised to serve a double lantern. The saturator for this purpose is, from the outside, not unlike two of the single saturators described at the time spoken of. The portion for the lower lantern does not differ from the particulars we gave, excepting that the lime is now made to turn from the back instead of the side. The portion of the saturator for the upper lantern is as shown. The oxygen is admitted at A. The stream is then divided by the tap, that which is conducted to the lower portion of the saturator passes upwards through the stuffing B, which has previously had a charge of ether placed in it. The oxygen thus saturated passes out at D, and thence reaches the mixing chamber E, at which time it becomes equivalent to the hydrogen of ordinary mixed jet. According to the regulation of the tap a stream of pure oxygen is allowed to pass viâ the tube C to the jet, F represents the lime for the upper lantern.

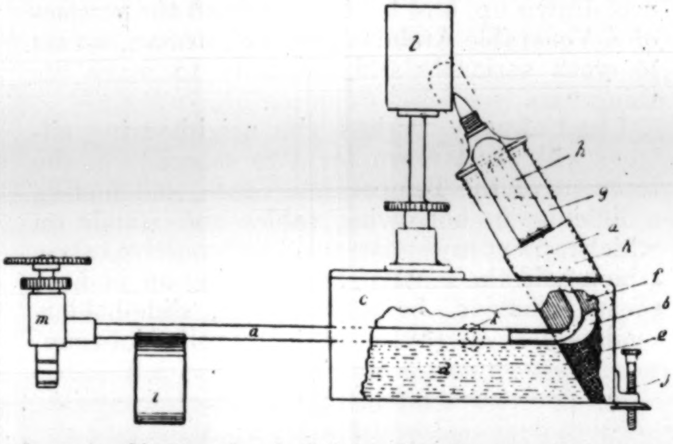


Gridiron Saturator.—This saturator, which is small and compact, is, as we stated a couple of months ago, not unlike a model boiler in appearance. The arrangements for conducting and saturating the gas will easily be understood from the following cut:—

A supply of ether having been poured in at the thumb-screw on top, the connection from the oxygen-bottle is attached at A, which acts the part of a Y or T piece, each branch of which is controlled by a screw-down tap, that for the saturated side of jet being B. The gas having passed up this tube, finds its way into the outer saturating chamber F, through fine holes in the circular tubing G. The gas eventually enters the second chamber E, the packing in which is of different density to the outer chamber. The stuffing in this chamber terminates at the dotted lines, and the saturated gas finally passes to the jet by the tube D. The pure oxygen reaches the jet by means of the other tube, the proportions of which are controlled by the tap similar to B. We have, at intervals during the past few months, given this saturator repeated trials and find it satisfactory in every way. It is made by Mr. F. Brown, 13, Ossulston-street, N.W.



Suter's Saturator.—The inventor of this apparatus has designed it for use with benzoline, and arrangements are made for replacing the supply of the volatile fluid in the saturator as quickly as it is used. The lower chamber, or cistern C, contains stuffing, and into this several ounces of benzoline are poured. Sufficient fluid is kept in the upper or saturating chamber by a species of wick which connects the two. This upper chamber, or vapourizer *g*, is, after the light is burning, kept sufficiently warm by an adjustable copper-heater *h*. The oxygen is admitted at the valve *m*, and is admitted to the saturator, at *b*, whence it reaches the nipple; the direct oxygen supply reaching the same part by the tube closer to the nipple. The lime is shown at *l*. An overflow screw is placed at *k*, which enables the user to determine when a sufficient charge has been poured in. The screw foot *j* adjusts the height of light to the condenser. The hind feet *i* work in the usual tray-runners of the lantern. Owing to the ready means afforded for heating the vaporizer, this lamp works well with benzoline. It is our intention, however, shortly to try it with an ether charge, modifying the heating arrangements slightly.



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Cycling with the Lantern.

By W. D. Askew.

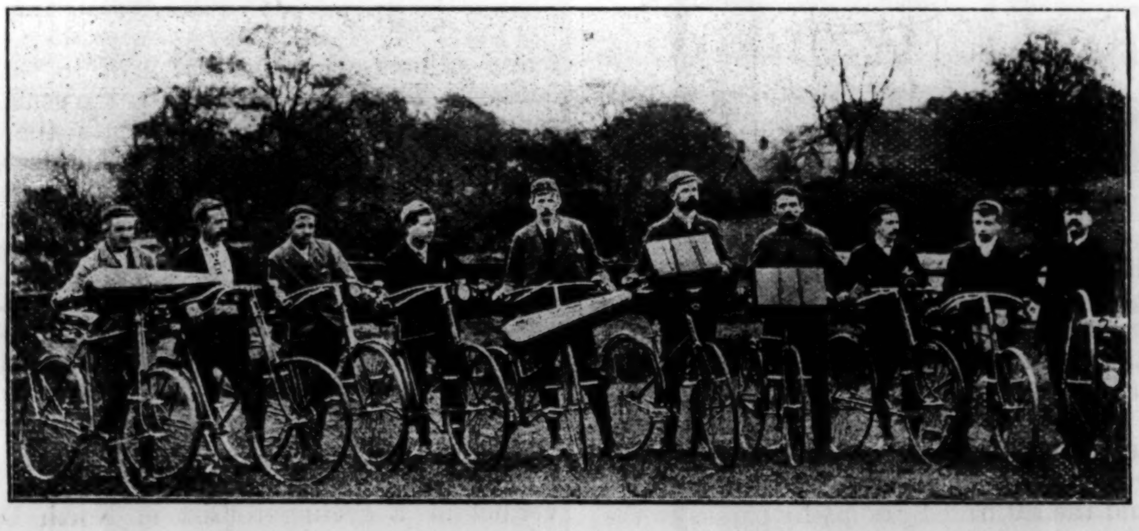
"Scenery lovely, roads execrable" was the verdict of a cycling tourist in North Devon, who seemed to have been at once charmed and exasperated.

But in spite of the general "cussedness" of the highways our little town started a cycling club, and one day as I watched my companions of the wheel file out into the country on an official run, it struck me that they represented a good percentage of the entertaining element of the place. One was great at recitations, another was quite a crack singer, and some half-dozen others were decidedly possessed of musical talents. Now, if I could only carry my lantern on my bicycle, there goes my orchestra said I to myself.

Settling the question in my own mind, I proposed a scheme that same evening to these worthies that we should give an experimental entertainment at a village six miles distant in aid of the village reading room, each man to carry his own instrument. The idea was hailed with delight, and three violins, a cornet and flute were enlisted on the spot. Two others volunteered to perform on the pianoforte and 'cello, on condition that these instruments (being of a delicate nature) should not be strapped to their machines.

These exceptions being indulged, a programme was drawn up, and having obtained the services of a Venerable Archdeacon as chairman, we set to work seriously and solemnly to make the thing "go."

I had already worked the neighbouring villages with the lantern for two seasons, in the interests of the Temperance cause, and finding a difficulty in borrowing tables and stands on which to fix up my apparatus, I had contrived a box which held the lantern, and opening up in hey, presto! fashion, became a table, slide-holder, reading desk, and tilting stand all rolled into one. This box was attached to a tripod, and thenceforth I eschewed all kitchen tables, schoolmaster's desks, egg boxes, stacks of books, and carried my own property with me.



The only drawback then was the hiring of a conveyance, which formed a large item in the expenses. This difficulty was now doomed by the bicycle project, and I cudgelled my brains to reduce my paraphernalia to the smallest possible limits. The result was two compact cases and a tripod. No. 1 box (the hey, presto! box) contained my lantern. No. 2 box held a nine feet screen, carrier, oil can, and fifty slides, the latter being protected by a compartment lined with india-rubber tubing. Each box measured 7½×10×16, weighing when full about 18 lbs. This weight (N.B. less than that carried by a fully equipped military cyclist) is due to the fact that I used an ordinary commercial lantern, an extremely good one, but not the smallest or lightest even of its kind. But my boxes, large as they were, were not the most ungainly items in the baggage. Taking a stroll on the eve of the eventful day, I met a cyclist prowling along in the moonlight with something weird, gruesome, and mysterious attached to his machine. To my relief I found it was not a midnight body-snatcher making off with a coffin, but a very respectable and careful member of our party rehearsing with his fiddle case.

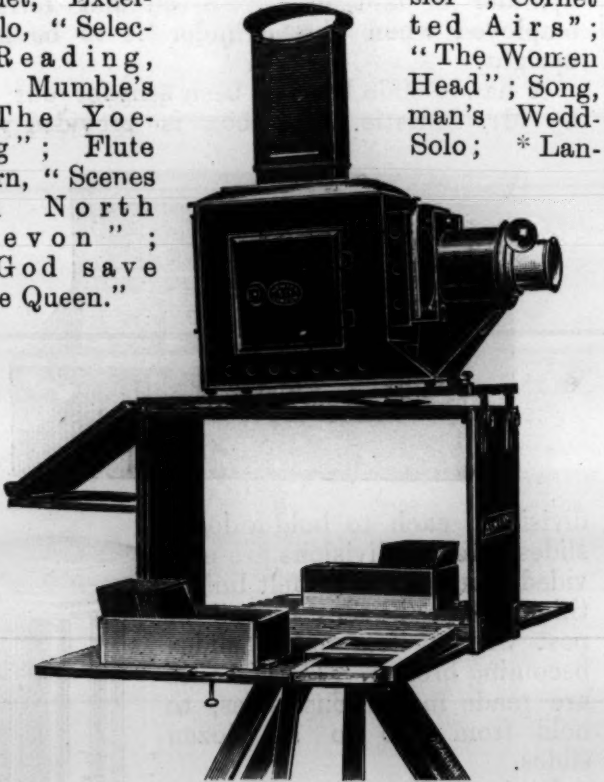
Well, the appointed hour found us all ready, with the exception of the crack singer, who appeared before the inevitable photographer with nether integuments never made for cycling, and an overcoat close buttoned to the chin, as if he were throttling himself in the effort to protect his throat. But we must not be uncharitable, for having only his voice to carry, we had packed him off with No. 2 box. The run to the village was very enjoyable and very amusing, for we must have looked like a lot of fellows rushing off to the pawnshop to "pop" all we possessed. We had been well advertised, with the result that the little community was stirred up to a circus or menagerie pitch—which is saying a great deal.

The schoolroom was half packed before we entered, but before my orchestra had tuned up, the lantern was in full working order.

My stand answered even more purposes than it was designed for. Revolving as it did on a circular tripod head, it made the lantern a search light, and I was enabled to illuminate the pianist for a song, or the orchestra for an overture. Not only that, but a refractory boy in a dark corner collapsed instantly when his deeds were brought to light, and had I thought of it in time, an introductory slide might have been thrown on the blind of a window in my rear which faced the village "square," for the picture could be returned to the screen, centred and focussed at a moment's notice.

The following programme was rather successful judging from its reception, and our crack singer fairly brought down the house, with "The Village Blacksmith," the verses, as he sang, being illustrated by a splendid set of life model slides.

Programme.—Part I. Overture, "Calif de Bagdad;" Song, "There is a flower that bloometh;" *Recitation, "Little Jim, the Collier's Boy;" Flute Solo, "Scotch Airs;" *Song, "The Village Blacksmith;" Duet, "Friendship;" Violin Solo, "William Tell;" Quartette, "The Miller's Wooing." Part II. Overture, "Advance Guard"; *Song, "The Miller of the Dee"; Duet, "Excelsior"; Cornet Solo, "Selected Airs"; *Reading, "The Women of Mumble's Head"; Song, "The Yoeman's Wedding"; Flute Solo; *Lantern, "Scenes in North Devon"; "God save the Queen."



The entertainment over, the good-natured Archdeacon, who was highly pleased regaled us in the Reading-room, after which we lit our lamps, strapped on our luggage, and trundled off home, applauded by a few daring spirits who had kept out of bed till 10.30.

The project had turned out a success.

My machine, being a heavy roadster with one inch solid tyres, behaved admirably under the circumstances, but my opinion concerning the unnecessary size and weight of the ordinary form of optical lantern, always strong, was now very pronounced.

The ingenious individual who invented the lantern made it, I believe, so that he got inside and worked it, and the evolution of the instrument even to its present size seems to have been a painfully slow process carried out with much reluctance.

The essential parts of a lantern appear to me to be light, condenser and objective.

Why the light should be enclosed in a case of iron or brass-bound mahogany passes my wit to understand. A screen of canvas lined with asbestos is surely enough to confine the light and keep off the heat.

As a cyclist I have outlived the "bone-shaker" period, but assuredly not as a lanternist.

But I see better things looming ahead. In the near future these clumsy commercial lanterns, from the ordinary single which would almost kennel a poodle dog, to the terrible three-decker, which takes a horse and cart to shift; all these lumbering contrivances, like the wooden bicycles of bye-gone days, will be swept into the limbo of forgetfulness, and cycling lanternists will be able to scour the country with very little more to carry than our favoured friend the snap-shot man.

Then, and not till then, will the problem of brightening village life by lantern missions from larger towns be satisfactorily and efficiently solved.

We have a great army of cyclists wandering aimlessly about our roads on one hand, and the best possible medium for instruction and entertainment on the other. Combine these forces and you have a power that would elevate the life and cheer the heart of rural England more than a dozen royal commissioners.

—:o:—

New Apparatus, &c.

BINDING STRIPS.

BINDING strips, with space for the title and also spots, are being brought out by Messrs. Butcher & Son, of Blackheath. These binders, which are of the style shown, are put up in boxes, each containing sufficient to bind 100 slides. Instead of the binders being in one piece, they are in short lengths, each being exactly the length to bind one edge of a slide. Those who have found any difficulty in securing the corners when binding slides will find this form exceedingly convenient. The combination binders made by this firm, and which we noticed last season, have been improved.

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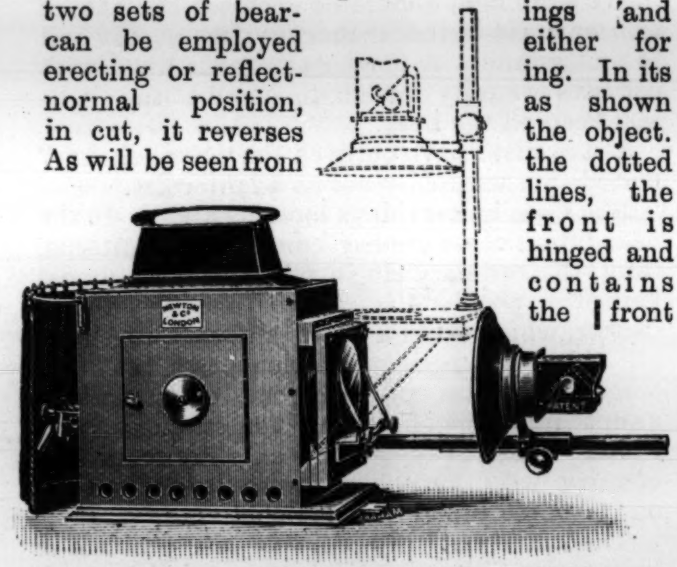
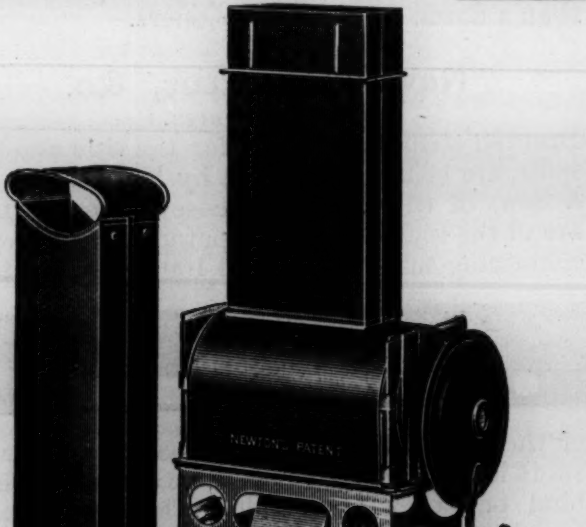
* Illustrated with Lantern.

DEMONSTRATOR'S LANTERN AND LAMP.

For the benefit of those who may want to use a single lantern, and yet have occasion to work rapidly from vertical to horizontal projection, Messrs. Newton & Co. have introduced a useful form, shown below. At the front of the objective an attachment with a prism can be quickly set into place. This prism has two sets of bearings and can be employed either for erecting or reflecting. In its normal position, as shown in cut, it reverses the object. As will be seen from the dotted lines, the front is hinged and contains the front portion of the condenser. This when moved up and a mirror interposed, converts the instrument into a lantern with horizontal stage. When in this position the prism acts the part of a reflector. When required, the stage may be removed, thus leaving plenty of room for placing any object that may be required.

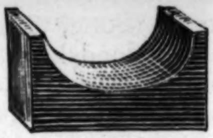


The above firm have also brought out a new lamp, the result of a series of experiments. The lamp, as shown, is lighted and the wick adjusted so that it does not smoke; then, after burning for a minute or two, the supplementary chimney is set on top of the other. This method, Messrs. Newton claim, enables the flames to be at once under control.

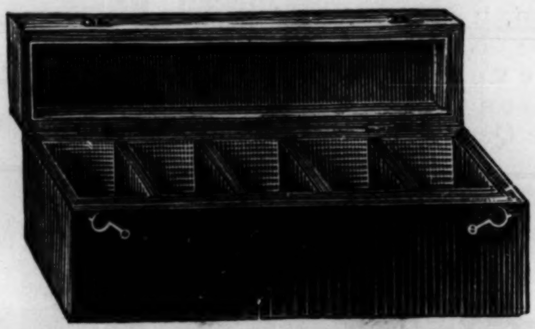


CYLINDER REST, SLIDE AND LIME BOXES.

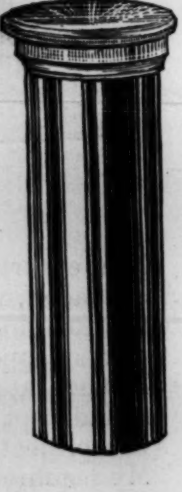
Mr. J. Christie, 129, West Street, Sheffield, is this season introducing some novelties in lantern matters, one being a convenient crutch or rest to prevent cylinders from rolling about when in use. This rest is shown, the upper portion being hollowed out the cylinder is laid in it. A circular form is employed when the cylinder is to be kept upright.



A handy slide box has been sent for our use by Mr. Christie. The box is provided with divisions, each to hold a dozen slides. As the divisions are provided with a thick felt lining, this box may be sent by rail or post without fear of the slides becoming broken. These boxes are made in various sizes, to hold from two to six dozen slides.

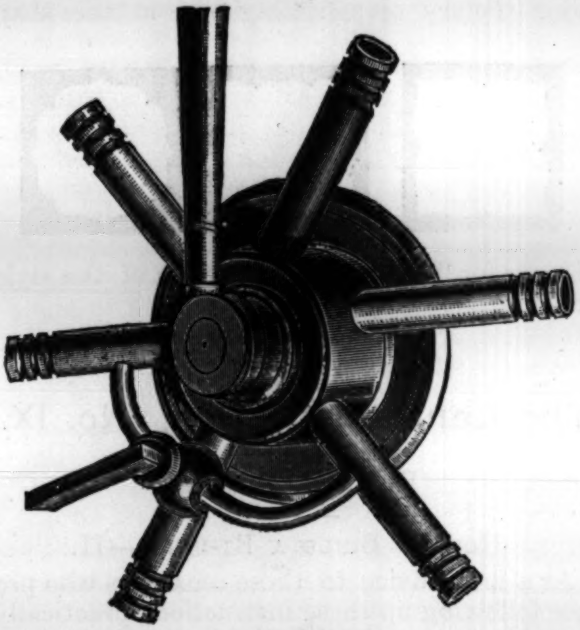


With the foregoing came a nice little brass box, capable of holding a couple of limes. Personally we have found them a great convenience. Seeing that the price is only a shilling, they should be in great demand.

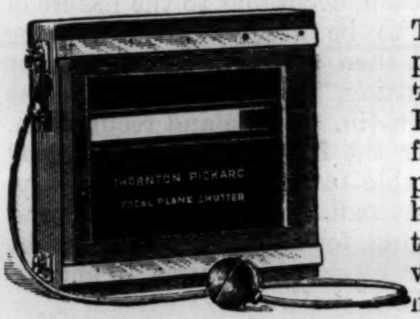


DISSOLVER.

So as to prevent any chance of gases becoming mixed in a dissolver should it become worn, Messrs. Theobald & Co. have brought out a form, termed the "Ideal," in which the oxygen is contained in an upper chamber, whilst the hydrogen is confined to a lower. The one plug thus acts the part of two plugs. A close examination of the drawing will show that certain tubes are set back in their mount, whilst others are attached nearer the front edge.



SHUTTER.



THE new focal plane shutter of the Thornton Pickard Manufacturing Company, Altrincham, Manchester, is now provided with a means for adjusting the size of the slit. This improvement adds greatly to the range of speed of the shutter, which now extends from 1-20th of a second to 1-1000th of a second, and allowing not only for the fastest instantaneous work possible, but also for all ordinary instantaneous work down to the slowest. For prolonged exposures the shutter is wound up to the top as when focussing, and a cap or a time shutter may be used in the ordinary way without removing the focal plane shutter from the camera.

COMBINATION JET.

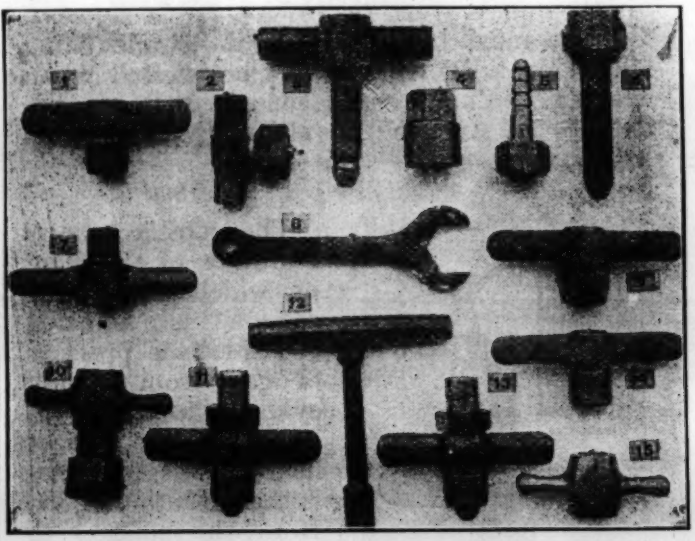
THIS jet can, by the slight movement of a lever, be used either as a blow-through or a mixed jet. An ingenious arrangement has been devised immediately below the nipple by the maker (Mr. E. H. Kloot, 18, Aldgate Avenue, London, E.C.), by which the change spoken of is effected.

SUNDRY APPARATUS.

MR. W. I. CHADWICK has a number of valuable and handy apparatus, such as lanterns of various styles, triple condensers, carriers, jets with mechanical adjustments, vertical attachments, microscopes, polariscopes, portable reading lamps and desks, and also a small but useful click signal as a means of communication between the lecturer and operator. No battery is used with the click, and it is always ready for use. The particulars of the above and other apparatus will be found in Mr. Chadwick's two-page advertisement in the centre of this journal.

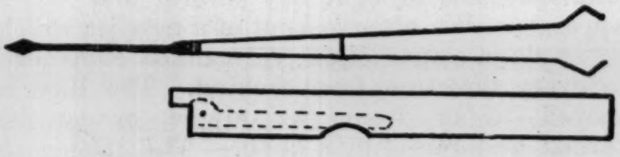
CYLINDER FITTINGS.

A VARIETY of kinds of cylinder fittings are now being made by Mr. A. Clarkson, of Bartlett's Buildings, Holborn Circus, E.C., one or more of which enable attachments of cylinders to be made, so that any desired connection can be fitted. In the annexed diagram their relative uses will at once be apparent to the lanternist.



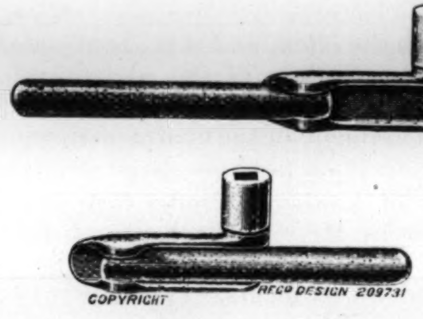
LIME TONGS AND BORER.

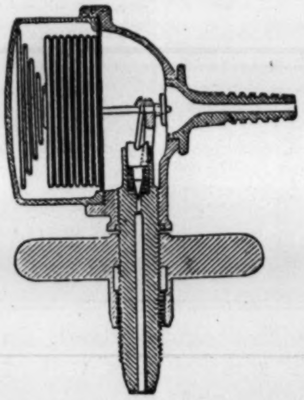
ON page 160 of last issue many of our readers will have noticed a space at the lower portion of the first column. This was occasioned by an accident having happened to the block soon after the printing machine was started. We have had another illustration of this useful piece of apparatus prepared, which we produce herewith. We understand that the tongs will be in the hands of dealers in a few days, and will retail at 1s. 6d.



CYLINDER KEY AND REGULATOR.

The cylinder key of the Scotch and Irish Oxygen Co., which we show both open and closed, possesses many advantages to recommend it. It offers great leverage for opening valves, whereas when closing them much less leverage must be used, for the handle being hinged the full force can only be exerted when opening. This arrangement reduces the liability of straining a valve by closing it too hard.





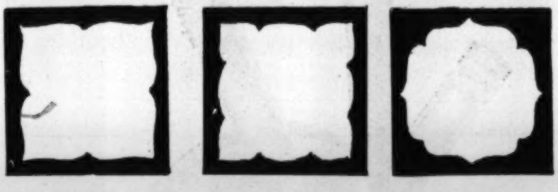
The metallic bellows regulator of this firm, of which we give a section, is adjusted to reduce the pressure of gas from a full cylinder to about 1½ lbs. to the square inch. This regulator is the invention of Mr. Brier, the manager to the Company, and is meeting with great favour.

MECHANICAL JET.

Mr. J. Lizars, of Buchanan Street, Glasgow, is most enthusiastic in matters pertaining to the lantern, and, as will be seen from his new catalogue, has brought out several new styles apparatus. We observe a cut of a new jet which is simple in construction, yet can be controlled in every direction from behind. The lime is moved to or from the nipple, or can be turned and raised by a knob. The raising or lowering of the jet is actuated by rack and pinion, and the horizontal movement is controlled. When adjusting the distance of the burner from the condenser, tube runners are drawn out or pushed in as desired.

SLIDE MATS.

A novel departure has been made by Mr. Wm. Tylar, of Birmingham, in the shape of mats for lantern slides. A few of the styles are here shown.



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The Lanternist's Den, No. IX.

By C. E. Rendle.

How to Build a Bi-unial—II.

As a first advice to those amateurs who propose following up these instructions practically, I would say, spend a few hours in putting your tools in order. Those that want grinding must be ground; if there is no convenience at home they can be taken to the cutler, who charges from a penny each according to the nature of the instrument to be ground. If the plane wants resetting, then reset it. If the saw or saws want recutting, screw them up in the bench vice, take a 4in. saw file and recut them. Ignore altogether the false adage about a good workman being able to do anything and everything with a rusty nail. That's humbug, and goes without saying, for experience has taught us that the clever mechanic requires an endless variety of the best tools.

It is advisable to have a clean oilstone always at hand, which may be well covered with sweet oil during the process of sharpening.

The Body.

In selecting the timber—which should be the best Baywood—commonly known as "Honduras mahogany," the lighter shades are preferable, the grain being closer. Care must be taken in getting it thoroughly seasoned, and unless one is expert in the choice of this, it will be advisable to trust to a respectable dealer in the material.

Although, as before stated, addresses will be given where most of the requisites can be obtained, at the same time it must be borne in mind that many of these can only be of service to those readers resident in or near London. The local tradesman, therefore, must be consulted and referred to when found more convenient.

It may be here mentioned that the special wood for our requirements can be had from Mr. George Tappin, 38, High-street, Kingsland, N., or Messrs. Marshall & Co., Old-street, St. Lukes, both of London. Probable cost of wood for entire lantern body 2s. to 3s.

A suitable board $\frac{3}{4}$in. thick is best. This must be brought to a dead flat with the smoothing plane, which may be ascertained by occasional gauging.

Perhaps it will be found more convenient to many with limited accommodation, to do this planing up separately, that is to say, the various parts and pieces as they are each in their turn treated. Nevertheless, if it can be done as a whole it is best.

The board when flattened as described, should be fully half-in. in thickness.

First let us take the front Fig. 1. At a glance it will be seen that this is clamped together, and that the clamps are mortised and tenanted on. Prepare a piece of your wood $19\frac{1}{2}$ in. long, and 8 in. wide, the grain to run longways. This must be perfectly square on the edges, and as accuracy is essential, I would advise it to be marked for the worker's guidance as Fig. 2. Black-lead pencil lines lightly drawn are all that is required, as they will afterwards be papered out. As the wood is true on the edges a T square may be employed.

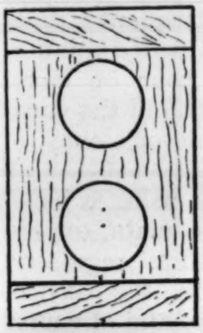
Fig. 1.

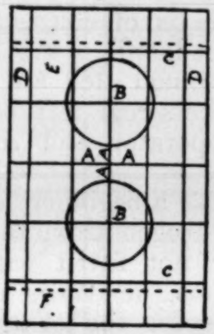

Fig. 2.

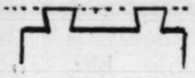
Fig. 3.

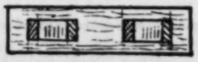
Fig. 4.

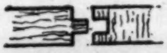
Fig. 5.

First draw the two centre lines AA, which will give the direct centre. From end to end and from side to side these lines should be equidistical. With a pair of compasses or dividers, set at $4\frac{7}{8}$ mark from the point named, the centre of the circles at BB, alter the dividers to $2\frac{3}{8}$, and make the two complete circles. It will thus be seen that the diameter of these condenser openings will be $4\frac{3}{8}$, and that they will be exactly 5 in. apart.

Set compasses to $8\frac{1}{2}$ in., and mark from centre for lines CC. Now draw lines DD $1\frac{1}{2}$ in. from each side, and EE $2\frac{3}{4}$ in. also from each side. It may here be noticed that these guide lines are A centre, BB condenser-holes, CC depth of clamp, DD and EE depth and size of tenons, the dotted lines FF depth of mortise.

The circles may now be cut out. Make a hole in each with your stock and bit, or if you don't happen to have one use a large gimlet, and be particular in keeping the cutting well within the lines.

With a cabinet piercing saw cut out the circles, or, by the way, a 7 in. key-hole saw will do well for this purpose, and can be purchased for 6d. from any dealer in carpenters' tools. Trim up to circle lines with spokeshave, or an 8 in. cabinet rasp, and when they are perfectly round, which can be found by gauging, smooth and finish off with glass-paper.

The next proceeding is to cut the tenons at top and bottom, Upon this the neatness of the work much depends. An 8-in. tenon saw and a $\frac{3}{8}$-in. chisel will be found best. Having cut these as shown in figs. 3 and 5, nicely finish and clean up. The next step is making the clamps. A couple of pieces of wood, just a shade thicker than before is wanted $8\frac{1}{8}$ in. in length and $1\frac{1}{4}$ in. deep. Mark from each end lines corresponding with those shown in fig. 2, DD and EE, and proceed to cut openings and mortice, to receive tenons. The open slots should be $\frac{3}{8}$ in. longer than the tenons, which will allow of a wood pin or plug being driven down on either side when putting together, and which is shown in fig. 4. The plugs are to be made almost square, and may be prepared; the required size will best be found by dropping the clamp over the tenons, and then trimmed to fit on each side. Be careful that they are not too loose, nor yet too tight, for if the latter, the wood is likely to split when driving in to fix. In fitting the various parts it is a good plan to get into the habit of marking them, so that they go into the same places each time.

The front, in its eleven parts, which of course includes the eight plugs, may now be put aside while we turn our attention to the back.

Perhaps it would be advisable before leaving the subject of clamping to direct the attention to the fact, that while the grain of the wood of, say, the vertical piece described above, travels longways, so also does it, in the piece which lays horizontally, but when the two are fixed together, they are pulling in contrary directions (see fig. 1). It is this pulling one against the other that makes this class of cabinet work so far superior to the ordinary tongued and grooved clamp. This latter is resorted to by the majority of body-makers: not because it is best, but because it can be done in half the time.

The back (fig. 6) is made in exactly the same way as the front, and as the clamped ends are the same size in every way, they need not again be described. The apertures shown in the diagram, and which are to receive the jet trays, may be cut to the taste of the worker as far as design goes. The wood is to be marked in the same way as before. The centre line A being made first, next mark C C $1\frac{1}{4}$ in. from each end, D D $1\frac{1}{2}$ in. from each side, E E $2\frac{3}{4}$ in. G G $3\frac{1}{2}$ in. also from sides, H $1\frac{1}{2}$ in. from bottom, K $1\frac{1}{2}$ in. from centre line A.

When the apertures have been pierced out, to shape, then the clamping may be proceeded with as in the case of the front. They may each be put together in the following way.

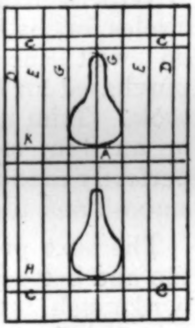

FIG. 6.

MAKING GLUE.

Break into small pieces some of the best Scotch glue, sufficient to about half fill the glue pot, cover with cold water, and allow to stand twenty-four hours, when it may be observed that the glue will have absorbed the greater part of the water. A little more may be added and then placed over a slow heat to simmer; stir occasionally, and when dissolved it should have about the consistency of golden syrup. If thicker more water must be added gradually.

Screw into your vice—which, by the bye, should be of wood—the lantern front, one end uppermost; paint the tenons and mortise with glue, drive on the clamp with a small mallet and then insert the plugs, which may be driven securely in their several places. This having been done much of the glue will have been forced out, and should be wiped off with a piece of clean rag. Each end of both back and front may be similarly treated, and they may be put aside in the dry. If the worker possesses wooden clamps which are made for this purpose, they can be used with advantage,

(To be continued.)

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Hints to Inexperienced Lanternists.

By A. M. Hiddon.

To the expert operator, the management of limelight apparatus seems such a very simple and easy matter that he can hardly understand how anyone can ever find it difficult. Mishaps, even of the most trifling nature, rarely happen to the experienced lanternist; while the beginner, using perhaps the same apparatus, often finds his first attempts at operating marred by sundry more or less embarrassing and disturbing incidents. I propose to deal with a few of these hitches and mishaps, in the hope of rendering the path of the novice more smooth.

Many minor accidents occur from mere clumsiness of fingers and, more often still, from a want of familiarity with the apparatus used. The would-be operator frequently loses sight of the fact that he will have to do his work more or less in the dark, and under circumstances which will not fail to add to his confusion if anything goes wrong. The lantern, its dissolver and jets, look simple enough by daylight, but they become considerably more complicated when half enshrouded in darkness and nearly red hot. Under these circumstances nuts become singularly intractable, screws refuse to turn, accessories become mislaid, and the bewildered operator has to deliberate for a full minute before he can make up his mind whether the cylinder valve closes to the right or to the left. The only remedy for such a state of affairs is of course frequent "dress rehearsals"; not lasting a few hurried minutes only, but continued for an hour or more, in order to make a real test both of the capability of the operator and the efficiency of the apparatus.

Let us suppose a beginner is using a blow-through jet, hydrogen from the main, oxygen from a cylinder not fitted with a regulator. As likely as not he turns on the oxygen without first opening the jet tap, and of course gets no light. Just as he is proceeding to investigate the reason why no gas comes through, off blows the rubber tubing with a sudden snap! No damage is done, however, and the matter is soon put right. Later on in his lantern career, when he becomes the possessor of a regulator, he finds that it is very necessary to keep the jet tap closed when first opening the cylinder valve, in order that the back pressure thus obtained may bring the regulating apparatus into play.

With a blow-through jet the hydrogen supply has frequently to be conveyed from a considerable distance, and the indiarubber tubing by which the service is usually effected is a fruitful cause of mishaps. If laid on the floor, someone treads on it; if stretched across, somebody walks through it, and pulls it down. The only really serious danger connected with limelight is the possibility of coal gas escaping out into the room in considerable quantities. Directly any hitch or unforseen occurrence takes place, it is the duty of the operator to see that the hydrogen supply is properly cut off. An escape of oxygen does no harm, but a leakage of coal gas is a far more serious matter. It is not wise to use a greater length of tubing than will just reach the lantern, and if it must be brought along the floor, it is an excellent plan to encase it in a few short pieces of old iron gas pipe.

It is well to make sure that the lantern is not filled with coal gas before introducing a light into the interior. Beyond a sudden puff, sufficiently strong, perhaps, to blow the rose-top off, nothing serious occurs, but sometimes an explosion from this or some similar cause will cover the condenser with a film of lime dust, &c., which, if unnoticed, will interfere with its condensing powers during the rest of the exhibition. With a blow-through jet the most inexperienced cannot bring about a dangerous admixture of gases. Even if the cylinders be connected to the wrong taps of the jet, the only result is a perfectly useless light.

The blow-through is frequently spoken of as the "safety" jet, but, as a matter of fact, the mixed jet has just as good a claim to be considered safe when cylinders are used. For consider the conditions under which this jet is worked. Oxygen gas supports combustion, but cannot of itself either burn or explode. Hydrogen by itself will neither burn nor explode so long as it is pure and unmixed with oxygen in any form. A lighted taper introduced into a cylinder of coal gas is at once extinguished; though, of course, the gas would burn if in contact with the air.

These two gases are contained in separate cylinders, and are kept apart in separate tubes until they reach the chamber of the jet. Here they become mixed, and may be considered to be in an explosive state. Under certain conditions the light may "snap back," and a small harmless explosion in the chamber take place, but it is quite impossible for the flame to pass backward along either the tube of pure hydrogen or pure oxygen.

Under no circumstances could one gas pass by way of the jet backward to the other cylinder, because in doing so it would bring to bear upon the rubber tubing a pressure it most certainly would not stand. This, of course, only refers to cylinders. The use of gas-bags by an inexperienced operator cannot be advised. Safe they may be in the hands of an expert; but their use by a novice almost amounts to foolishness, while, with a mixed jet, to take the hydrogen supply direct from the main is more than foolishness. The circumstances hinted at above, under which a light will snap back and explode in the chamber, are where the aperture of the nipple is too great or the gas pressure too small.

The seriousness of an explosion in the mixing chamber is greatly increased if the dissolver is not in perfect order. Some are not very wisely designed, and with such, faulty workmanship will sometimes permit a slight admixture of the gases to take place; but even in this case the harm is confined to the jet and dissolver and the tubes between them.

With regard to flame extinguishers, pumice tubes, &c., I cannot conceive that they are needed, nor do I think that they would prove effectual supposing explosive conditions did prevail. This, however, is merely a personal opinion, and is not based on any experience derived from their use.

Cracking a condenser is an accident which sometimes happens to operators, experienced or otherwise. This is generally the result of carelessness, either in not giving it time to warm up by degrees, or else by forgetting to revolve the lime. When such an accident occurs, it is well not to be in too great a hurry to replace the broken lens, as sometimes it is the metal casing which needs alteration, and which, until set right, will break lens after lens. In many ways the extreme heat to which a lantern is subjected in the course of a long exhibition is a great searcher out of defects. Ill-made jets become unsoldered and fall to pieces; lime-pins refuse to turn; and, in the case of small lanterns, the heated wood warps and sometimes takes fire. Some of the modern patterns of mahogany lanterns are undoubtedly too small, and in them compactness has only been secured at the cost of efficiency.

In the above lines I have only dealt with trifling mishaps, because, with pure gases from cylinders, no serious dangers exist. The apprehension with which the limelight-producing apparatus is regarded in some quarters is based on reminiscences of a past time, long before modern appliances were introduced. Still, these mishaps, though trifling, are annoying when they do happen, and the surest way to avoid their occurrence is to consider, thoughtfully and carefully, the theory of the matter, and to learn the why and wherefore of each part of the apparatus before putting it to practical use.

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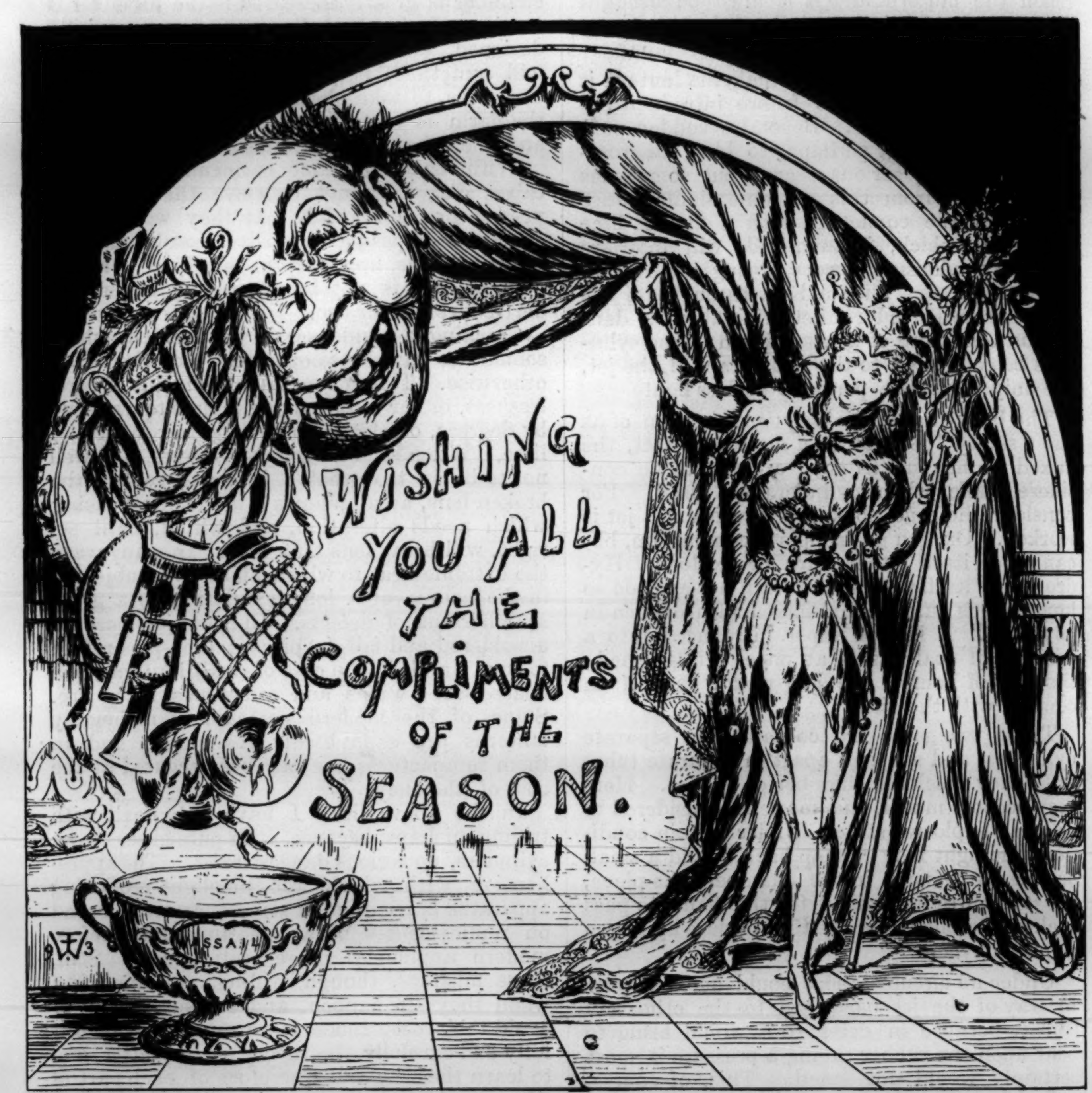
"USE THE LANTERN ON SUNDAY NIGHT," was spoken to Mr. NIX, as he believes, from heaven. He says; "I knew the voice too well to make any mistake. I asked God to reveal to me how the thing could be arranged. It was all made plain to me within the space of ten minutes. The idea was carried out, and at the very first service the hall was crowded. Now I have 1,300 Gospel and Temperance slides."—*Christian Herald.*

CURTAIN DESIGN.



In accordance with the promise made in last journal (under editorial table) we give a reproduction of the design made by Mr. F. F. Weeks, 21, Thorpe Road, Forest Gate, London, E. In order to reproduce this design it was necessary for it to be sketched entirely in line, hence it will not appear with that softness in the shadows that characterizes the drawings Mr. Weeks usually produces; the shadows in which are obtained by a series of washes which gives a particularly clear effect when photographed.

Our object for giving the sketch this month instead of in December is to enable our readers at distant parts of the world to utilize it, if desired, for the festive season.

The Rival Merits of Single and Double Lanterns.

By C. Goodwin Norton.

Many persons, particularly those whose pockets are limited, have some difficulty in deciding whether they shall purchase a single or double lantern.

Consulting the various catalogues of different makers will not do much to solve the difficulty, as nearly all of them will contain particulars of some marvellous invention which will make a single lantern perform all the duties of a double one, or there will be a biunial offered at about the same price as a single.

Before purchasing, the lanternist should make up his mind as far as possible to what use he intends to put his lantern to. This may be summarized as follows :—

(1) To amuse a few friends or children at home, and to show home-made lantern slides.

(2) To illustrate a lecture of a purely scientific nature, or where plain views are to be shown.

(3) Where the lantern is part of an entertainment to be given in various places, the sizes of which the operator has no previous knowledge of.

(4) When the lantern is always to be in the same place, as at a public institution, and to be used for any and every purpose for which a lantern is required.

(5) When the whole entertainment depends upon the lecturer, the lantern, and the operator.

In the first case a single lantern is all that is required, as it is of little consequence whether the slides follow each other with unvarying regularity, and it is only a question of trouble and expense whether limelight or oil is used.

For scientific purposes a single will also do, but if the audience is likely to be large and not all composed of the exhibitor's immediate friends a double lantern is desirable.

In the third case a biunial is a matter of necessity, if only for the look of it, and even in the most careful hands the lime will sometimes crack or the light require retrimming; and again the public expect something in the way of effects.

When the lantern is always stationary the operator is not troubled with different sets of lenses, and he can make nearly everything a fixture.

But when the lantern and lecturer have nothing to assist them a triple is a necessity, as many of the best effects can only be shown with three lanterns.

The chief stumbling-block in the whole matter is the method of changing the slides. Many are the elaborate arrangements for this purpose, many of which would work well if all slides were the same thickness and size; but they never are, and some of the slide-changing machinery is as elaborate as that of a clock, the makers apparently forgetting that everything connected with the carriers has to be done in the dark and at a time when the whole of the operator's attention should be elsewhere. What can be more annoying than for a slide to stick or the "Patent Simplisiveness Double-Single dissolving carrier" to refuse to work in the middle of a lecture. It is all very well for makers to declare that their particular pattern of single dissolver answers as well as two lanterns and that dissolving views are things of the past, and to compare elaborate lanterns to lacquered bedsteads. Why are bedsteads polished and lacquered, since this affects their sleeping qualities only in a remote degree? And yet everyone who can possibly afford the expense has ornamental furniture.

Of course it would be absurd to have a highly ornamented lantern and neglect the optical parts, &c.; but the softest beds are generally found on the best-looking bedsteads. The public like to see an imposing and grand looking lantern—it gives them confidence before the exhibition begins, and he would be a clever lecturer who could convince them that a plain-looking single would produce anything like the results of the magnificent triples used by our best exhibitors.

The best and simplest method of changing unframed slides in a single lantern is by means of a double-sliding carrier (the invention of Mr. Groves). This pattern has no machinery to get out of order, nothing to stick or go wrong; each slide can be exactly centred, and the operator is sure of the whole of the picture appearing on the screen at the proper time. As before stated, dissolving can only be effected when two lanterns are used, but the nearest imitation of it can be made without any machinery or special apparatus at all.

Supposing we have two slides of the same subject—"the Tower of London by day and by night." The day scene would be shown first in the sliding carrier, and the night scene placed in the reverse end of the carrier. Now let the operator gradually but quickly cover the nozzle of the lantern with the right hand, beginning with the tips of the fingers, which should be stretched as far apart as possible until the palm completely covers the light; immediately the obscuration is complete, the night scene should be placed in front of the condenser with the left hand. The right hand is then removed from the front in exactly the reverse order to which it was placed there. Though this seems such a simple matter considerable care and dexterity are required, as the whole principle depends upon persistance of vision that is the time the retina of the eye retains the image formed upon it, which is somewhere about half-a-second; consequently the whole operation of covering the aperture, changing the slide, and uncovering must be effected in that short space of time. Perhaps the simplest pattern of a single lantern with a slide-changing apparatus is that known as the metamorphoses, which has two separate slide holders one above the other. Either of these can be brought opposite the condensers slowly or quickly by moving a lever, and by using the double-sliding carrier in one and leaving the other open for the introduction of a framed slide; the operator can be sure of no serious mishap as far as the changing of the slide is concerned. The beginner should steadily resist the temptation to purchase any of the many appliances by which one lantern can be made to do the work of two, or which will produce some marvellous effect quite different from anything else previously shown until he has secured independent advice upon the subject. It is well known that the best exhibitors use the most simple apparatus, their efforts being to dispense with everything about a lantern that can possibly be done without, and not how much machinery can be crowded into it.

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Oils and Oil Lamps for the Lantern.—VI.

By W. H. Harrison.

The series of articles on the above subject, coming to a conclusion to-day, has been written in the hope that the facts brought together therein may be useful to inventors who seek to improve the efficiency of the magic lantern. On the present occasion the intention is to summarise some of the leading points in what has already been written, and to amplify the particulars where such amplification may be useful.

As regards the tendency of some petroleums to smell more when burning than do others, after proper care has been taken in keeping the outsides and insides of the lamps clean, American petroleum has had an advantage over that from the Black Sea, as already mentioned, one effect of which has been that in trade competition, the American oil has been able to command a slightly higher price. During the past summer, however, according to the *Journal des Mines*, the proprietors of the Baku petroleum springs have begun to put on the market a better-refined oil, said to be inoffensive in the matter of smell, and they have given to it a reddish tinge to differentiate it from the ordinary supply. Previously it has been pointed out that some petroleums from oil-producing regions of small extent are said to have pleasant aromatic smells, and it may now be added that the Sumatra oil is said to have no smell at all.

Taking a bird's-eye view of the petroleum supplies of the world. there are three excessively large ones, namely, the North American, the Black Sea, and the Sumatra supplies. The latter is a comparatively new one, and English and Dutch companies have obtained concessions enabling them to work an area 320 square miles in extent. The Dutch company alone has as yet set to work, and expects to produce 2,000 tons daily by the end of this year. It hopes at the outset to drive the Russian and American petroleum trade from Singapore, which consumes about 38,000 tons per month. According to *The Board of Trade Journal*, the *Java-Bode* announces that Mr. Leyden, of the firm of Messrs. Rathkamp & Co., Batavia, has made a chemical and physical analysis of the Sumatra (Langkat) oil, and that he has reported that it is colourless, quite neutral and without offensive smell, mounts quicker in the wick than any other oil, and that with equal consumption it gives more light than either the American or Russian oil. His photometric trial for the same time of burning and quantity of oil gave the following results:—Russian, 97; American, 100; Langkat, 109. A peculiarity of the Langkat wells is that they are close to the sea and to a fine harbour, so the oil can be shipped at little expense. The Sumatran petroleum industry has begun to exercise a strong influence in the southern hemisphere.

Petroleum has a tendency to get cheaper, the supplies being so abundant that the chief expenses are those of transit, storage and refinement; indeed, there are experts who think that in course of time it will be selling in this country at farthings instead of pence per gallon. As a solitary example of the abundance of the supply, it may be mentioned that on March 1st last Mr. P. Stevens, the British Consul at Batoum, reported to the Foreign Office that a new oil well has recently began to flow at Baku at a rate which considerably exceeds the daily output of all the largest wells which have hitherto been in activity in the Aspheron Peninsula. It is estimated that it is delivering about 18,000 tons of crude oil per day, and as a flow of this magnitude cannot yet be got under control, the oil is running to waste into an adjoining lake known by the name of Romani.

The Scotch supply of paraffin oil is relatively small, but interesting, as being so near home, and for possessing such a high quality that it is used for lighthouse illumination. It is distilled from shales, and is refined by elaborate processes, so is not obtained easily from its source. The shares of most of the companies interested in its production have for some time past been declining in value; they are held almost entirely in Scotland, and chiefly by small shareholders.

Peru possesses vast stores of petroleum not much worked. Altogether, there is not much fear of the supply of petroleum for magic lanterns running short. A more important circumstance is that householders need not trouble about coal wars if they exert themselves to use petroleum for heating purposes as much as possible, and to use coal only in rooms where a fire in an open grate is desired for the sake of its cheerful appearance. The great obstacle to the increased use of petroleum for household purposes is the prejudice of uneducated persons who do not know how to burn it properly, so complain of its "smell," not knowing that the effluvium comes from their own ignorance. Petroleum is the economical fuel of the future, and the abolisher of the smoke nuisance from household chimneys.

Turning now to another phase of the subject, concentric petroleum argand flames will, in my opinion, in due time supersede the present three-wick flames, because they give a more even illumination of the screen, and in their best form more light, but above all because they permit the use of a properly placed and curved reflector with advantage. Reflectors are of doubtful, if of any, advantage with the straight three-wick lamps, but with a concentrated cylindrical flame will be of the greatest value. Three-ring concentric flames have been recommended as the best, but burners for them will prove much more expensive than two-ring burners, and more troublesome to use; lighthouse men like the two-ring burners better than the three-ring; they are simple, useful and serviceable, but any enthusiast in lantern work will prefer the three-ring, despite its extra cost. For popular lantern displays, in which great sharpness of image is less desirable than abundance of light upon the screen, the Trinity House two-ring burner gives a smaller flame than can be used in the lantern with advantage; therefore if two-ring burners should come into use they may preferably be made larger in diameter than the Trinity House pattern, so as to burn more air and oil, and yield more light. Probably the Trinity House three-ring burner cannot have its diameter increased with advantage, the flame already perhaps being as large as can be used, without too much sacrifice of definition. The trumpet-shaped chimney of the Trinity House burners will prove specially advantageous, as they permit a reflector to come closer to the flame than is possible when ordinary paraffin lamp glasses are used. What is wanted is a small reflector, as close as possible to the flame, yet collecting and throwing back through the flame a wide angle of light; this will be found not alone to greatly increase the illumination of the screen, but to also considerably increase the heating of the condenser, an effect which will have to be mitigated by inventions in other directions, and not by going without the extra light.

In course of time, in my opinion, double condensers will become obsolete, in the case of any purchaser possessing sufficient intelligence to know what he is buying, in which class may be included nearly everyone in the photographic world. If a man can buy a condenser collecting an angle of ninety degrees of light from a radiant, he cannot have much intelligence should he buy a condenser collecting only sixty degrees, which means practically the losing, say, of half the available amount of light actually in the lantern, and which the inferior double condenser prevents reaching the screen. What is the use of producing a certain amount of light in a lantern, and then throwing half of it away? If advertisements in the journals be watched, it will be seen that triple condensers are gradually creeping into use; what is not yet stated in those advertisements is whether they are made of colourless glass, with no green, blue, yellow, or other tinge, like some I have seen of continental manufacture. Also I think that even at the outset we should not be limited to one size of triple condensers, but that rising by half-inches they should now vary from four to five and a half inches in diameter. This class of condenser is likely to prove extra useful in photographic enlarging, so that either the exposures may be shortened, or with the same exposure increased sharpness of enlargement be obtained by the use of a smaller diaphragme. To get colourless glass, pressure should be brought by dealers to bear upon the manufacturers to make the glass of materials free from the presence of soda and of oxide of iron. A potash glass is necessary.

The last opinion to be expressed is, that before long no experienced person will buy a lantern with a large tin cone fixed to its front, to carry the projection combination. This cone is in the way, and prevents the use of the lantern for many scientific purposes. The tin-cone lanterns and their double condensers will in time probably sink more into the rank of toy lanterns, but the use of the lantern is now so extending in all directions, that their sale may perhaps not be less large than at present.

There is a want of improved oil lanterns for use in private homes rather than for public exhibition purposes, for most of us perhaps know individuals who will use none but the oil light at home, and who are aware that there is plenty of room for improvement in the lamps and optical systems at present connected therewith.

Experiments for the Domestic Circle.

By L.

1. Draw a landscape with Indian ink, and paint the foliage of vegetables with muriate of cobalt, and some of the flowers with acetate of cobalt and others with muriate of copper. While this picture is cold it will appear to be merely an outline of a landscape or winter scene, but when gently warmed the trees and flowers will be displayed in their natural colours which they will preserve only while they continue warm. This may often be repeated.

2. Write upon paper with a diluted solution of muriate of copper; when dry it will not be visible, but on being warmed, the writing will become a beautiful yellow.

3. Into a large glass jar, inverted upon a flat brick tile and containing near its top a branch of fresh rosemary, or any other such shrub, moistened with water, introduce a piece of flat heated iron, on which place some gum benzoin in gross powder, the benzoic acid in consequence of the heat will be separated and ascend in white fumes which will at length condense and form a most beautiful appearance upon the leaves of the vegetables. This will serve as an example of sublimation.

4. Mix a little acetate of lead with an equal portion of sulphate of zinc both in fine powder; stir them together with a piece of glass or wood and no chemical stain will be perceptible; but if they be rubbed together in a mortar the two solids will operate upon each other and intimate union will take place and a fluid will be produced. If alum or Glauber salt be used instead of sulphate of zinc the experiments will be equally successful.

5. Put a little fresh calcined magnesia in a teacup upon the hearth and suddenly pour over it as much concentrated sulphuric acid as will cover the magnesia. In an instant sparks will be thrown out, and the mixture will be completely ignited.

Editorial Table.

Botanical Slides.—A few botanical slides have been received from Messrs. Geo. Phillip & Son, 32, Fleet-street, E.C. These are photographed with a dark background, and are artistically coloured, and are in every way suited to impart valuable information to pupils, especially in winter, when specimens are not procurable.

Temperance Subjects.—As usual at this time of year, the Band of Hope Union, 60, Old Bailey, E.C., are issuing new sets of slides. A capital set, entitled "Abstinence and Hard Work," is now ready. This set consists of 12 slides, made from paintings by Mr. J. F. Weedon, and are beautifully rendered. We append a sketch made from one of the slides, showing a representation of the work of narrowing the gauge of the Great Western Railway from Exeter to Truro and branches (over 200 miles), accomplished by 5,000 men in 31 hours, without alcohol; oatmeal and water being the only drink provided.

Scripture Slides.—Mr. Christie, 129, West-street, Sheffield, has forwarded slides relating to the nativity and childhood of Christ. The slides consist alternately of passages from Scripture, and pictures illustrating same. The set comprises 28 slides. Many other subjects are treated in a similar manner.

Catalogue.—Each year the catalogue of Mr. R. H. Clark, of Royston, gets thicker and thicker, that just received containing 130 pages. Lanterns, fittings, and slides are described at prices so moderate, that it is astounding that they can be produced for the amounts quoted.

Slides (General Views).—Some fine slides have been sent to us by Mr. W. D. McLellan, of 36, St. Paul's-road, Canonbury, N. These are rich in tone, of great vigour, and very clear. The transparencies are made on gelatine plates, but is a difficult matter to say, when viewing them, whether they are made on collodian plates or not.

Sets of Slides.—A neat and effective way is adopted by the Onward Optical Co., 126, Portland Street, Manchester, for enabling intending purchasers to inspect their slides. They mount a print from each negative in folios or albums, one of which has been sent for our inspection. The folios contain many sets, mostly from life models, but now and then a slide had to be made from drawing by Mr. F. F. Weeks to complete the set. The sets include Daisy's Influence (21 slides); Eva's Kiss (10); Little Flo (7); Netta's Rabbit (14); and several others. The figures of the life models are well arranged.

HILL NORRIS LANTERN PLATES.—Mr. W. Tylar (Birmingham) is wholesale agent for these plates, which are made by the Birmingham Dry Collodio Plate and Film Company. The plates are found to be certain and free from grain. A great advantage is that they may be finished off in a few minutes, as they can be dried over a lamp. They give fine tones of great delicacy. With these there is no fear of the slides deteriorating by being kept in position in the lantern for any length of time. Development on the screen can be shown with these slides as the film remains uninjured by the heat from the illuminant. Care must, however, be taken to provide a tank for the purpose supplied, with yellow glass in the side next the condensers.

—:o:—

Correspondence.

TINTED-GLASS SCREENS FOR THEATRICAL EFFECTS.

(*To the Editor.*)

SIR,—It may interest those of your readers who have to provide parochial entertainment to know how to produce the coloured-changing lights for the illumination of tableaux, etc., such as are used in theatres, but without special apparatus beyond the lanternist kit. I have succeeded in doing this with an ordinary lantern, and with home-made screens. I first tried coloured glasses purchased at a glazier's, but I found the colours were so dense that they occasioned a serious loss of light. I then took some ordinary sensitized lantern plates, fixed them in hypo and washed them thoroughly. I then had glasses with a thin coating of gelatine over them, perfectly transparent; the gelatine film whilst still wet from the washing were tinted with ordinary penny dyes purchased at a chemists. The dyes were dissolved in a little methylated spirit, a sufficient quantity of the alcoholic solution was mixed with water, and poured into a tea saucer. In solutions thus prepared the glasses were immersed until they acquired the desired tints, when they were lightly washed and set up to dry; when dry they were mounted like an ordinary slide with a rectangular mat. These were slipped into a lightning-carrier, and used as an ordinary lantern-slide would be, in a lantern furnished with a short focus lens. The lantern having been previously set up at the requisite distance to cover the group, coloured lights can thus be thrown and instantly changed.

Yours truly,
W. MILES BARNES.

WHO INVENTED DISSOLVING VIEWS?

(*To the Editor.*)

SIR,—In relation to the interesting information which has been elicited in the discussion on the above subject, a reminder may be given that all claims to priority of invention or discovery have to be based upon priority of publication, and not upon the testimony of friends. The earliest act of publication is what is wanted. So far, the earliest evidence in this matter on which a claim to priority can be based in the scientific world is in the old playbills which I saw in your office. The earliest one was undated, but, I was informed, contained internal evidence that it was issued in 1832; the others were a few years later in date. In all of them the inventor of dissolving views was described as "Mr. Henry Childe." Would someone kindly make attested copies, between "quotation marks," of the portions of those bills relating to Mr. Childe and his invention, also the dates and places and copies of the imprints where such exist? The facts recorded will then pass into authenticated history. Mr. Wood and others have named earlier dates, but only mentioned the year, and not the place or the day of the month of the exhibitions. If they will supply the latter items they will enable me, when I get the leisure, to search up old local newspapers of the dates and places mentioned, and thus older dates of publication than those in the playbills may perhaps be found. Some time or other I will also look up old local newspapers of the dates mentioned in the playbills, thus perhaps obtaining additional historical information on the subject.

W. H. HARRISON.

(*To the Editor.*)

SIR,—In your issue for September, a Correspondent, still signing his contributions "SUUM CUIQUE," although invited by Mr. Harrison, Mr. Howard, and myself to give his name, appears with a magazine article, an illustration, some bills, and some extracts from my former letters, all for the purpose of demolishing the information I have communicated through your columns on the subject of the "Invention of Dissolving Views." With regard to the quotations from my letters, he is singularly unfortunate, as he is in error in both cases. No. 1.—He says "that special artists were employed to execute the designs for the Polytechnic pictures and that I have since acknowledged this to be correct." If he will kindly refer he will find my words to be "that at times the designs were prepared by artists other than Mr. Hill." This is totally different to the rendering he would ask us to accept. Error No. 2.—He states "that I have for the last three months claimed for Mr. Hill the invention of the fans used in dissolving." I must certainly protest against this as I have not used the word fans in this connection, the dissolver having no fans but being composed of sliding plates as stated by Professor Pepper in his work on "Light" and which corroborates my contention. Mr. Trevor called attention about two months ago to the fact that Mr. Baker in an article in the LANTERN JOURNAL, March, 1892, gave the date of the invention of Dissolving Views as 1846, but although requested to reiterate his statement he has remained silent. Mr. Baker says "Dissolving views date back to the year 1846, when Mr. Childe, the artist, introduced them, after having been at work for five years, expending much time and money in experiments." This is a clear and definite statement.

The question is "Who invented dissolving views?" my answer being that they were the joint invention of Messrs. Childe and Hill, each being responsible for a well-defined portion of the invention; and one correspondent at least has fully grasped the meaning of my explanation. I am referring to the letter of Mr. Howard, in which he at the close of his remarks exactly defines the position I have taken up. His words are as follows:—"This gives the idea that Mr. Hills' suggestion introduced an improvement on a principle used by Mr. Childe, and Dissolving Views as we have them were introduced. Granted all this, it would appear that Dissolving Views, as we understand them nowadays, were introduced about 1846 by the firm of Childe and Hill, mainly owing to the suggestions of Mr. Hill, who having seen the old style of dissolving or fading off of the pictures of Mr. Childe gave to the world what we now understand as Dissolving Views, but that the idea was the outcome of a method used many years previously by Mr. Childe. The whole backbone of "SUUM CUIQUE's" contention is that Mr. Childe invented Dissolving Views (which were perfect) in 1811. As to this question I would point out that Sir David Brewster in his celebrated "Letters on Natural Magic," published in 1833, describes the various effects to be produced by lanterns, but makes no mention of Dissolving Views. Now I ask you simply, as a matter of probability, would a man occupying a high position in the scientific world have been ignorant of the fact of the existence of this invention if it was at that time an accomplished fact? The idea cannot be entertained for a moment.

From 1811 to 1839, which latter is the only date on "SUUM CUIQUE's" bills in which the words Dissolving Views appear there is an absolute vacuum. He does not attempt to explain how it is that Dissolving Views were exhibited during these twenty-eight years, and that no record exists or mention is made in scientific books of their existence. No book that I have ever read and no man with whom I have spoken has ever put forward such a suggestion as this. It is untenable. Mr. Childe's methods previous to about 1840 have been described. It will no doubt be in the memory of some of your readers that the late Royal Polytechnic Institution was opened in 1838. It then consisted of the Great Hall and the Small Theatre. In 1840 the Large Theatre was built by a private gentleman (Mr. Mounteney Nurse), who generously allowed the Institution to acquire it on easy terms. For about four years pictures by the late Charles Smith and Mr. Clare, together with astronomical diagrams and chromotropes, were exhibited by means of the double lantern, illustrated in the *Magazine of Science*, under the superintendence of Dr. Bachhoffner, the first scientific lecturer at the Polytechnic, and who invented the word "chromotrope," which he applied to Mr. Childe's coloured revolving designs. In 1845 Mr. Hill, who was in business with Mr. Childe, invented the sliding plate dissolver, the ideas of Messrs. Childe and Hill were adopted by the directors of the Polytechnic, and Mr. Collins, an instrument maker who had a stall in the Institution, was commissioned to build six large lanterns, with condensers of 10 inches diameter, four of which were fixed in a frame, and presented the following appearance:

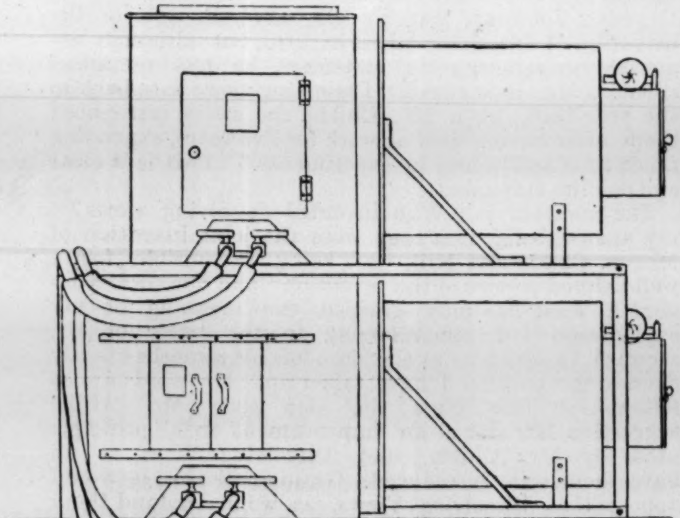


Fig. 1.

The whole result was exhibited at the Polytechnic in 1846, as I have before stated, and the diagram, Fig. 1, is from a sketch made by myself in the Optical Room at the Polytechnic. A short time previous to the sale of the Polytechnic stock I purchased two of these six lanterns, and enclose two photographs of one of them, the first, Fig. 2, representing the three-quarters front view, and the other the three-quarters back view, with the iron body removed in order to render the working parts visible as in Fig. 3. I must explain that the small lens close to the jet was not added until several years afterwards, and that the whole lens arrangement resembles a triple condenser to the great improvement of the light. It will be seen that the object lenses are much larger than those illustrated in the *Magazine of Science*, as the tentative lanterns of 1843, which were just half the size. On this account large lenses were introduced between the views and the objectives in order to bring the whole of the rays passing through the picture within the diameter of the object lenses. It will be observed, too, in the September illustration, the lantern fronts are placed close together, so that it would be impossible to introduce effects, the whole movements of which occupied a space greater than the ordinary pictures. The stages, too, being closed at the top, no up-and-down movement, such as the snowstorm (on glass) mentioned in the article, could possibly have been introduced. The writer in the *Magazine of Science* speaks of dissolving views as something entirely new, something that the representative of a scientific periodical had never seen before. This, please bear in mind, was in 1843, but mark that "SUUM CUIQUE," who brings forward this article as the main support of his contention, asks us to believe that dissolving views were invented and exhibited in 1811. This, to my mind, cannot be regarded as either lucid or logical. He tells us in his

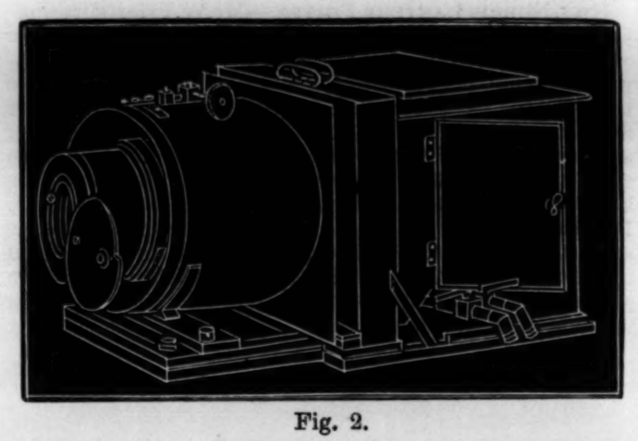


Fig. 2.

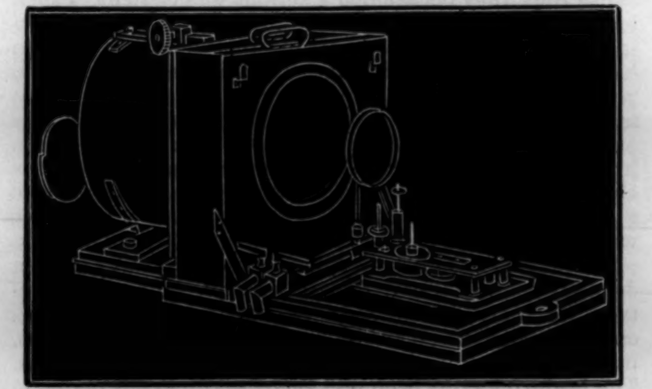
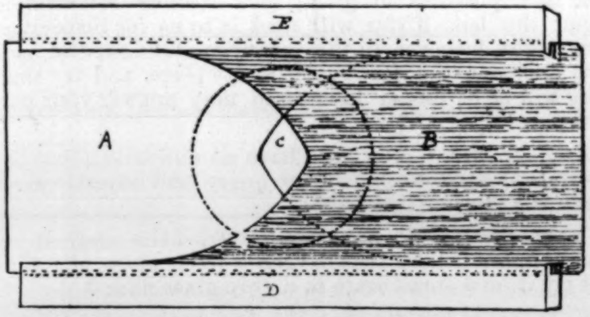


Fig. 3.

first letter that he is in a position to prove that Mr. Childe alone invented dissolving views, and then, as a convincing and knock-down proof produces this article, which states in plain words *that they were not invented by Mr. Childe at all, but by a German named Phillipstall.* This is overshooting the mark with a vengeance, and we shall next expect to see the suggestion gravely advanced that they were not invented at all, but, like Topsy in "Uncle Tom's Cabin," "they grew." The "Encyclopædia Britannica" certainly describes dissolving views, and suggests three references to those who care to get to the root of the matter: they are "Brewster's Optics," "Ganot's Physics," and the "Manual of the Magic Lantern." Neither "Ganot's Physics" nor "Brewster's Optics," mention the name of the inventor or the date of the invention of dissolving views.

In Fig. 4 I give you a correct drawing of the original dissolver, invented by Mr. W. R. Hill, which, for the sake of clearness, is drawn separately from the lanterns at Fig. 1.



A, back plate; B, front plate; C, centre of dissolver just opening; D and E, pieces of wood with parallel grooves in which the plates slide.

I may mention that the two bottom lanterns were worked by the dissolver, the shutters being used on the top pair. Your readers will no doubt remember, or can see by referring to the number for May, that this unknown correspondent very kindly and courteously charged me with insulting a dead man's memory, and with drawing on my imagination so palpably that he felt it incumbent on him to address to the respected editor of this journal the few polite and well-chosen words which accompanied his first appearance in this matter. He told us that he had in his possession bills of entertainment given by Mr. Childe sixty years ago, and others of later date. Now let us examine them.

Bill No. 1 informs us that at the Theatre Royal, Brighton, Dissolvant (not dissolving, please note) Views will be exhibited on April 8th; but which April 8th in what year "Suum Cuique" did this take place?—the bill does not state the year at all. It is contended that this took place in 1833, and to be quite fair to "Suum Cuique" I had search made, and am informed that April 8th, 1833, actually did fall on Monday, the day named on the bill, so that although there is no actual evidence on the face of the bill of the correctness of the year I am disposed to believe that he is probably correct in this instance. There appears to have been a sort of "variety show," as the views appear in connection with other entertainments of a totally different character. But now we come to something which will alter the whole complexion of affairs and put the date 1811 out of court now and for ever. Please give me your closest attention. On the bill we find these pregnant words. "The evening's performance will conclude with picturesque views which will be dissolved FROM the sight of the spectators in a manner truly astonishing." What a revelation is this! The views were dissolved, not one into another but from the sight of the audience; or, in other words, the light was gradually lowered, the view changed for that immediately following it, and the light again raised just as I have already described in detail in a previous letter. In the face of the direct and most important evidence sent by Mr. W. R. Hill last month it appears to me that there is absolutely nothing more to say and this piece of direct and explicit confirmation of my former descriptions of the early attempts to realise the dissolving effect will, I think, carry conviction to the minds of the most sceptical. We have not yet done with this bill; there is more to come. Let us not lose sight of the fact that these bills were produced to prove that dissolving views were exhibited in 1833. I quote from this bill the following words: "These novel and interesting features will be relieved and diversified by a variety of grotesque and splendid increasing and diminishing figures." What is the meaning of this. Does "Suum Cuique" imagine that your readers as so simple, or so ignorant, that they do not recognise the old Phantasmagoria which was exhibited in London by Phillipstall in 1802? No, "Suum Cuique," I am afraid we cannot settle the question in the way you desire on the strength (or I should say weakness) of these bills.

But we will not condemn the date 1811 at once without further enquiry, so let us turn to—

Bill No. 2.—Here again we find the views described as dissolvant, being the same as those in the former case. As before, they form part of a mixed dramatic and variety entertainment, but, although the date July 29, 1834, is quite plain, there is not the most remote reference to the place in which the exhibition took place. I suppose it must have taken place in some building, unless the lanterns were dematerialised and he exhibition was held in space before an audience of Mahatmas. There is the name and address of a printer on the bill, but I must positively decline to accept this as any evidence as to the place of exhibition, as it is within my knowledge that many travelling lecturers have their coloured bills printed in America for use in England.

Bill No. 3 really contains the words "Dissolving Views," and, as this is dated 1839, and I have before stated that Mr. Childe commenced his experiments about 1840 (which was corroborated in this journal more than a year ago), it is very possible that these were some of the first crude attempts which were afterwards elaborated and produced in their present perfect form in 1846. I would most respectfully ask "Suum Cuique" if he now feels satisfied that he has been in error. Just one fact to wind up with. When the perfected lanterns were completed for the Polytechnic, Mr. Childe painted "The Ruins of the Forum, Rome," being his first picture, painted to order, for the Institution, and at the same time was exhibited "Rome from the Tiber." Mr. W. R. Hill's first painting for the Polytechnic. This, I think, is a sufficient answer to the opinion of your correspondent "Suum Cuique," that dissolving views were invented "evidently" before either Mr. Hill or Mr. Wilkie were born."

With apologies for this lengthy letter,

I am, Sir,

Yours sincerely,

EDMUND H. WILKIE,

Late Royal Polytechnic Institution.

A FRIEND WANTED.

(*To the Editor.*)

Sir,—Being a stranger to London, and having no acquaintance in the metropolis, I should feel extremely obliged for your advice. I may say I am a coal-miner, having worked underground for 25 years, during which time I have zealously studied all matters in connection with coal-mining. I have written a lecture on the subject, the syllabus of which I enclose. The illustrations are mostly from drawings made by myself, showing the various modes of working our coal and the dangers to which the miner is subjected.

My motive for addressing you is from a desire to assist in relieving the distress in this neighbourhood caused by the lock-out of miners. I feel sure if some friend would assist me to give this lecture in London, I might be able to materially assist those so much in need.

Can you recommend me to that friend? I have a lantern of my own (single) with all requisites for oxyhydrogen light. If some friend would kindly allow the use of sheet and stretcher and manipulate the lantern, I should be extremely thankful.

I may say I can bring credentials from trade societies and ministers of all denominations in Sheffield, and other leading gentlemen. If you can assist me in this endeavour I shall esteem it a great favour.

I am, Sir, yours faithfully,
THOS. HAMMOND.

Sheffield.

[If any of our readers can assist our correspondent in obtaining a hall, we shall be pleased to put them in communication with the writer of above.—Ed.]

—:o:—

Notes and Queries.

S. Knight.—Lick a piece of glass with the tongue and allow to dry, dissolve in ordinary ink a small piece of sugar, and draw with this upon the glass; after it has set rub a piece of wool charged with dry lampblack over the lines; this will impart greater density

A. J. Archer.—Letter was forwarded. The triple form will collect the greater angle of light.

H. D. Bull writes, after reading the enclosed paragraph from a contemporary: "A well-known maker of lantern apparatus, himself a patentee of saturators, recently stated that ether had had its day with the advent of cheap compressed gas, and he was not far from the truth"—Would you advise me to use an ether saturator? *Answer.*—We are acquainted with the patentees of the various saturators introduced, but have never known any one of them to express those sentiments, and if they did express them we should consider that they were speaking about a subject of which they knew little, and that their opinion was not worth much. By all means obtain the one you ask about. We have used it for some considerable time, and consider it perfectly safe.

H. Harmsworth asks: Can you recommend me to a good lecture set of slides, illustrating the darker side of London life—other than Sim's "How the poor live", and Archer's "Slum life." *Reply.*—We do not know of any other set than those mentioned. We have often thought that a splendid set of slides might be obtained from negatives taken in the Rag Fair held every Friday in the Holloway Cattle Market. If any of our readers know of a set to suit our correspondent will they kindly advise us?

G. Bennett.—We cannot say what candle power the Trinity House burner will give on the screen; the other lamp gives nearly a hundred candle power when used without a lantern. With regard to your proposition to write to Trinity House on the subject, we would suggest that you address Mr. G. H. Slight, c/o Trinity House Workshops, London, E. This gentleman is an old lanternist, and also an authority upon the subject of illuminants.

M. Lowe.—We wrote to you by post.

B. J. H. writes: When using a bi-unial or triple lantern I find it very inconvenient to have to close the lens shutter of the lantern that has just been turned off; this I have to do, as there is a little light given off from the lime for a time. Can you tell me if there is any other method of preventing the light from showing from the lantern that has just been turned off? *Answer.*—A patent has been taken out by Mr. W. C. Hughes, of Kingsland, for a method of interposing a shutter in front of the lime from which the gas has been turned off. We believe it acts in conjunction with the dissolver, but no doubt particulars may be obtained from the patentee.

C. H. W.—You did not say what the focus of the lens was, or else we might have given you some definite information. Although the lantern is an old one you will probably find that the front of the lantern is capable of being altered so that the distance between the picture and lens can have more latitude than that provided by the rackwork on the lens. If you cannot alter this, we will have pleasure in giving you further information about the lens if you will send it to us for inspection. You might, however, in the meantime take out the back lens and put the front lens in its place, and try that. This will be of longer focus, and may answer your purpose.

Prof. De Frere.—You need have no difficulty about the saturator you speak of. Your query and advertisement came too late for last issue.

W. H. Spite.—We have not yet tried the method you mention, but believe that oxygen is freely given off. Why not try it on a small scale in a thin glass flask?

C. D. writes to state that the two books advertised in last journal were sold soon after the issue was published, hence the reason why several cheques, postal orders, and stamps were returned, there being about two dozen people who sent money too late for the books advertised.

G. B.—(1) The lamp you mention is one of the best. (2) As long as the screen is opaque and white, those of one maker are about as good as those of another. (3) The shorter focus of lens is the better for the lamp. (4) Either of the regulators to be found in our advertising columns will answer your purpose; they are both good.

Monkton.—With the same size disk the shorter focus of lens will give on the screen, roughly speaking, four times the light that the lens of the long focus will give.

Focal writes: I have a single lantern, short focal. Could you tell me best way to get it made into long focal, and probable cost? Will it require additional lens? *Reply.*—If you mean that the front of the lantern will not extend a sufficient distance, it will be necessary to get the tube of nozzle lengthened. If, on the other hand, you mean that you have a lens of short focus, and that you wish to have one of longer focus, much depends on the make of the lens. If a compound one, remove the back combination, and put in its place the front lens. If this will not answer, we can only say—get another lens of longer focus.

Tourist writes: I have set of slides entitled "The Tourist and the Tunnel," can any of our readers tell me where I can get a reading or poem for same, as, so far, I have failed to get one?

Snowball says: I purpose during the winter months taking some stereoscopic views of snow scenes. What exposures should I give with landscape lenses stop about F18? *Answer.*—Use about the same exposure as would be required on a bright summer day. The Askew box stand, as described on page 171, is made by Messrs. Newton and Co.